

REMARKS

Claims 1, 6, 8, 11-13, 15 and 17-23 have been amended, and claim 7 has been cancelled. Accordingly, claims 1-6 and 8-25 are pending in the present application. The claim amendments are supported by the specification and claims as originally filed, with no new matter being added. Specifically, support for the claim amendments can be found in Figures 15-16, and on page 15, line 15 to page 16, line 18 of the application as filed. Accordingly, favorable reconsideration of the pending claims is respectfully requested.

1. Rejections Under 35 U.S.C. § 102

Claims 1-10 and 12-21 have been rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,165,839 to Lee et al (hereinafter "*Lee*"). Applicants respectfully traverse.

Lee discloses silicon nitride spacers 26 on the sides of a bit line contact hole, extending from and adjacent a top silicon nitride layer 22 at a first terminus, adjacent an interlayer dielectric layer 21, and adjacent a cell plate structure (Figure 15). The spacers 26 terminate adjacent a silicon nitride layer 10 and at the top of a lower bulk insulator layer 9 at a second terminus.

Independent claims 1, 13, and 15 recite that the sleeve insulator layer has a first terminus adjacent to the conductor layer, and a second terminus opposite the first terminus and within the lower bulk insulator layer. In contrast, *Lee* discloses that spacers 26 have a first terminus adjacent top silicon nitride layer 22 (not a conductor layer), and a second terminus at the top of bulk insulator layer 9.

Independent claim 19 recites that the sleeve insulator layer has a first terminus adjacent the capacitor cell plate, and a second terminus opposite the first terminus and in contact with the capacitor storage node. In contrast, *Lee* discloses that spacers 26 have a first terminus adjacent top

silicon nitride layer 22 (not a capacitor cell plate), and a second terminus at the top of bulk insulator layer 9 which contacts silicon nitride layer 10 and polysilicon layer 20a (not capacitor storage nodes).

Accordingly, for at least the above reasons, Applicants submit that claims 1, 13, 15, and 19, as well as dependent claims 2-10, 12, 14, 16-18, and 20-21 are not anticipated by *Lee*. Applicants therefore respectfully request that the rejection of claims 1-10 and 12-21 under 35 U.S.C. §102(e) be withdrawn.

Claims 1-10 and 13-18 have been rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 5,973,910 to Gardner (hereinafter “*Gardner*”) for the reasons set forth on pages 2-3 of the Office Action. Applicants respectfully traverse.

Gardner discloses a structure in which a sidewall insulator 107 has a first terminus adjacent to the top of an insulative layer 105, and extends to the top of substrate 100 at a second terminus (Figure 2). A pair of capacitor conductor layers 102 and 104 both contact insulator 107, and a conductive contact 108 terminates at the top of substrate 100.

Independent claims 1, 13 and 15 recite that the sleeve insulator layer has a first terminus adjacent to the conductor layer, and a second terminus opposite the first terminus and above the semiconductor substrate. In contrast, *Gardner* discloses that insulator 107 has a first terminus adjacent to the top of insulative layer 105 (not a conductor layer), and a second terminus at substrate 100. Further, Applicants note that claims 1, 13, and 15 also recite that the conductive contact or plug extends beyond the sleeve insulator layer to terminate at a contact on the substrate. In contrast, *Gardner* discloses that insulator 107 and conductive contact 108 both terminate at the top of substrate 100.

Accordingly, Applicants submit that claims 1-10 and 13-18 are not anticipated by *Gardner*. Applicants therefore respectfully request that the rejection of these claims under 35 U.S.C. §102(e)

be withdrawn.

Claims 19-21 have been rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,475,247 to Kim et al. (hereinafter “*Kim*”) for the reasons set forth on page 3 of the Office Action. Applicants respectfully traverse.

Kim is directed to a manufacturing process for providing a contact structure, and discloses an insulating layer 15’ on the sidewall of a contact opening. *Kim* depicts the insulating layer as having a first terminus adjacent the top edge of a third dielectric layer 13, which is disposed over a second dielectric layer, which overlies a capacitor cell plate conductor layer 8 and an insulator 7 (Figure 3).

Independent claim 19 recites that the sleeve insulator layer has a first terminus adjacent the capacitor cell plate, and a second terminus opposite the first terminus and in contact with the capacitor storage node. In contrast, *Kim* discloses that insulating layer 15’ has a first terminus adjacent the top edge of dielectric layer 13 (not a capacitor cell plate). In addition, the second terminus of insulating layer 15’ does not appear to be in contact with a capacitor storage node as recited in claim 19.

Accordingly, Applicants respectfully submit that claims 19-21 are not anticipated by *Kim*. Applicants therefore respectfully request that the rejection of these claims under 35 U.S.C. § 102(b) be withdrawn.

2. Rejections Under 35 U.S.C. § 103(a)

Claims 11 and 12 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over *Gardner* in view of U.S. Patent No. 5,338,700 to Dennison et al. (hereinafter “*Dennison*”) and U.S. Patent No. 6,198,143 B1 to Ohsaki (hereinafter “*Ohsaki*”) for the reasons set forth on page 4 of the Office Action. Applicants respectfully traverse.

Claims 11 and 12 depend from claim 1 and thus include contain the limitations thereof. As discussed, claim 1 recites that the sleeve insulator layer has a first terminus adjacent to the conductor layer, and a second terminus opposite the first terminus and above the semiconductor substrate. Further, claim 1 recites that the conductive contact extends beyond the sleeve insulator layer to terminate at a contact on the substrate.

There is no teaching or suggestion in *Gardner* of these recitations in present claim 1. Rather, *Gardner* discloses that insulator 107 has a first terminus adjacent to the top of insulative layer 105 (not a conductor layer), and a second terminus at substrate 100. *Gardner* also discloses that insulator 107 and conductive contact 108 both terminate at the top of substrate 100. There is also no teaching or suggestion in *Dennison* or *Ohsaki* of these recitations in claim 1. For example, *Dennison* does not even disclose a sleeve insulator layer for a contact structure, while *Ohsaki* discloses an insulator 92 having a first terminus adjacent to the top of an insulating layer 78 (not a conductor layer).

Thus, even if the teachings of these cited references are combined, not all of the limitations of claims 11 and 12 would be met. Accordingly, Applicants submit that claims 11 and 12 would not have been obvious over the cited references. Applicants therefore respectfully request that the rejection of these claims under 35 U.S.C. § 103(a) be withdrawn.

Claims 22-25 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over *Lee* in view of *Ohsaki* for the reasons set forth on page 5 of the Office Action. Applicants respectfully traverse.

Independent claim 22 recites that the sleeve insulator layer has a first terminus adjacent to and in contact with the conductor layer, and a second terminus above the semiconductor substrate and within the lower bulk insulator layer. There is no teaching or suggestion in *Lee* of these recitations in present claim 1. Rather, *Lee* discloses that spacers 26 have a first terminus adjacent

top silicon nitride layer 22 (not a conductor layer), and a second terminus at the top of bulk insulator layer 9. There is also no teaching or suggestion in *Ohsaki* of these recitations in claim 22. Rather, *Ohsaki* discloses an insulator 92 having a first terminus adjacent to the top of an insulating layer 78 (not a conductor layer).

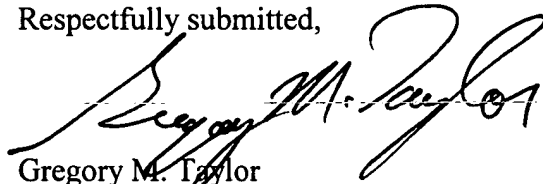
Thus, even if the teachings of *Lee* and *Ohsaki* are combined, not all of the limitations of claim 22 and dependent claims 23-25 would be met. Therefore, Applicants submit that claims 22-25 would not have been obvious over the cited references. Applicants therefore respectfully request that the rejection of these claims under 35 U.S.C. § 103(a) be withdrawn.

CONCLUSION

In view of the foregoing, Applicants respectfully request favorable reconsideration and allowance of the present claims. In the event the Examiner finds any remaining impediment to the prompt allowance of this application which could be clarified by a telephone interview, the Examiner is respectfully requested to contact the undersigned attorney.

Dated this 29th day of August 2001.

Respectfully submitted,



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VERSION WITH MARKINGS TO SHOW THE CHANGES MADE

IN THE CLAIMS:

Claims 1, 6, 8, 11-13, 15 and 17-23 have been amended as follows:

1. (Twice Amended) A contact structure for an integrated circuit comprising:
 - a lower bulk insulator layer situated above a semiconductor substrate;
 - a conductor layer situated above the lower bulk insulator layer;
 - a sleeve insulator layer in contact with the conductor layer, the sleeve insulator layer comprising:
 - a first terminus adjacent to the conductor layer; and
 - a second terminus opposite the first terminus, the second terminus above the semiconductor substrate and within the lower bulk insulator layer; and
 - a conductive contact [conductor structure] extending from and beyond the sleeve insulator layer to terminate at a contact on said semiconductor substrate, said conductive contact [conductor structure] being electrically insulated from the conductor layer by the sleeve insulator layer.
6. (Once Amended) The contact structure as defined in Claim 4, wherein the electrically insulating layer upon the conductor layer is an upper bulk insulator layer having a sidewall, [where in] wherein the sidewall of the upper bulk insulator layer is in contact with the sleeve insulator layer.
8. (Once Amended) The contact structure as defined in Claim 1, wherein the [conductor structure] conductive contact is at least partially circumscribed by and is in contact with said sleeve insulator layer.
11. (Once Amended) The contact structure as defined in Claim 1, wherein [said conductor structure] the conductive contact has an end on said semiconductor substrate that is composed of a refractory metal silicide material.

12. (Once Amended) The contact structure as defined in Claim 1, wherein said sleeve insulator layer [is composed of] comprises a material [selective] selected from the group consisting of Ta₂O₅ and Si₃N₄.

13. (Twice Amended) A contact structure for an integrated circuit comprising:

a lower bulk insulator layer situated above a semiconductor substrate;

a conductor layer situated above the lower bulk insulator layer;

an upper bulk insulator layer upon the conductor layer[, said upper bulk insulator layer having sidewall];

a sleeve insulator layer in contact with the conductor layer[, wherein the sidewall of the upper bulk insulator layer is in contact with the sleeve insulator layer], the sleeve insulator layer comprising:

a first terminus adjacent to the conductor layer; and

a second terminus opposite the first terminus, the second terminus above the semiconductor substrate and within the lower bulk insulator layer; and

a conductive plug extending from and beyond the sleeve insulator layer to terminate at a contact on said semiconductor substrate, said conductive plug being electrically insulated from the conductor layer by the sleeve insulator layer.

15. (Twice Amended) A contact structure for an integrated circuit comprising:

a lower bulk insulator layer situated above a semiconductor substrate, the lower bulk insulator layer having a sidewall;

a dielectric layer situated above the lower bulk insulator layer;

a conductor layer situated above the lower bulk insulator layer and above the dielectric layer, the conductor layer having a sidewall;

an electrically insulating layer situated upon the conductor layer;

a sleeve insulator layer in contact with the lower bulk insulator layer sidewall and the conductor layer sidewall, the sleeve insulator layer comprising:

a first terminus adjacent to the conductor layer; and

a second terminus opposite the first terminus, the second terminus above the semiconductor substrate and within the lower bulk insulator layer;

[and extending from the conductor layer to terminate within the lower bulk insulator layer above the semiconductor substrate, said sleeve insulator layer extending through and being in contact with each of the lower bulk insulator layer and the conductor layer, wherein each of the lower bulk insulator layer and the conductor layer has a sidewall in contact with the sleeve insulator layer;] and

a conductive plug extending from and beyond the sleeve insulator layer to terminate at a contact on said semiconductor substrate, said conductive plug being electrically insulated from the conductor layer by the sleeve insulator layer.

17. (Once Amended) The contact structure as defined in Claim 15, wherein the electrically insulating layer upon the conductor layer is an upper bulk insulator layer having a sidewall, [where in] wherein the sidewall of the upper bulk insulator layer is in contact with the sleeve insulator layer.

18. (Once Amended) The contact structure as defined in Claim 15, wherein:

said conductor layer is [said] a cell plate [to] of a capacitor and extends from said sleeve insulator layer to make contact with a capacitor dielectric layer of the capacitor, the dielectric layer being situated upon a storage node layer of the capacitor, the storage node layer being situated upon the semiconductor substrate;

said capacitor dielectric layer extends to make contact with the sleeve insulator layer;

said contact on said semiconductor substrate is an active area for a transistor having a gate in electrical communication with said conductive plug; and

said transistor is in electrical communication with the storage node layer of the capacitor.

19. (Twice Amended) A contact structure for an integrated circuit comprising:

a semiconductor substrate having an active region therein;

a capacitor storage node in contact with the active region;

a capacitor dielectric upon the capacitor storage node;

a capacitor cell plate upon the capacitor dielectric;

an electrically conductive plug in contact with the active region and the storage node;

and

[a first dielectric layer insulating the capacitor cell plate from the electrically conductive plug, the electrically conductive plug projecting from the active region above the first dielectric layer and the capacitor cell plate]

a sleeve insulator layer insulating the capacitor cell plate from the electrically conductive plug, the sleeve insulator layer in contact with the capacitor storage node, the capacitor dielectric, and the capacitor cell plate, the sleeve insulator layer comprising:

a first terminus adjacent to the capacitor cell plate; and

a second terminus opposite the first terminus, the second terminus above the semiconductor substrate and in contact with the capacitor storage node.

20. (Once Amended) The contact structure as defined in Claim 19, further comprising:

a first transistor situated upon the semiconductor substrate; and

a second transistor situated upon the semiconductor substrate, wherein:

a first portion of the electrically conductive plug is situated between the first and second transistors and between the semiconductor substrate and the [first dielectric layer] sleeve insulator layer; and

the capacitor storage node is in contact with an insulated spacer on each of the first and second transistors.

21. (Once Amended) The contact structure as defined in Claim 20, wherein the first portion of the electrically conductive plug is enclosed within the [first dielectric layer] sleeve insulator layer.

22. (Twice Amended) A contact structure for an integrated circuit comprising:

a lower bulk insulator layer situated above a semiconductor substrate;

a dielectric layer above the lower bulk insulator layer;

a conductor layer situated above the dielectric layer;

an electrically insulating layer formed conformably upon the conductor layer;

a sleeve insulator layer[, composed of] comprising a material selected from the group consisting of Ta₂O₅ and Si₃N₄, [and such that] the sleeve insulator layer comprising:

a first terminus adjacent to and in contact with the conductor layer; and

a second terminus opposite the first terminus, the second terminus above the semiconductor substrate and within the lower bulk insulator layer; and

[extends through and is in contact with each of the lower bulk insulator layer and the conductor layer;

is in contact with the dielectric layer; and

extends from the conductor layer to terminate within the lower bulk insulator layer above the semiconductor substrate;

an electrically insulating layer formed conformably upon the conductor layer and having a sidewall that is in contact with the sleeve insulator layer; and]

a conductive contact [conductor structure] terminating at a refractory metal silicide material contact on said semiconductor substrate and being electrically insulated from the conductor layer by the sleeve insulator layer.

23. (Once Amended) The contact structure as defined in Claim 22, wherein the conductive contact [conductor structure] is at least partially circumscribed by and is in contact with said sleeve insulator layer.